REMARKS

The applicants appreciate the Examiner's thorough examination of the application and request reexamination and reconsideration of the application in view of the following remarks.

The applicants acknowledge and appreciate the Examiner's allowance of claims 76, 77, 93, 94 and 96-108.

The applicants also acknowledged and appreciated the Examiner's prior indication that claims 50, 53-63 and 91 would be allowable if written in independent form including all of the limitations of the base claim and any intervening claims, and the applicants' claims 96-108 were presented previously in response.

The applicants further acknowledge and appreciate the Examiner's current indication that claims 73-75 would be allowable if rewritten in independent form, and new claims 109-111 herein are presented in response.

The Examiner rejects claims 1, 64-66, 70-72, 78, 80-83 and 92 under 35 USC §103(a) as being unpatentable over U.S. Patent No. 6,108,594 to *Didinsky et al.* in view of U.S. Pat. No. 6,454,217 to *Rodden et al.* The Examiner admits that *Didinsky et al.* fails to disclose a controller system for synchronously integrating an output of the star camera system and an output of the gyroscope into a stream of data. The Examiner states, however, that *Rodden et al.* discloses this element missing from *Didinsky et al.*, citing Fig. 2 and column 3, lines 7-39 of *Rodden et al.* in support.

Rodden et al. teaches that a primary attitude sensor 21 (i.e. a non-inertial reference system such as a star-based system) provides a quaternion vector with respect to inertial coordinates relating to spacecraft attitude to hyper-complex differencing system 23. *Rodden et al.* further teaches a secondary attitude system 22 (such as an IMU or gyroscopic system)

provides spacecraft attitude reference in inertial coordinates. In hyper-complex differencing system 23, these inertial coordinates (from secondary attitude system 22) are converted to quaternion vector format and compared with the quaternion vector provided by the primary attitude reference system 21. Using the comparison results, hyper-complex differencing system 23 compensates for inherent inertial drift in the secondary attitude reference system 22.

In sharp contrast to the applicants' claimed invention, *Rodden et al.* does not teach or suggest that there is synchronous integration of the star camera "output" with the gyroscopic system "output". The "outputs" of *Rodden et al.* are separate, i.e. not integrated (and not synchronously). In fact the "output" from the secondary (e.g. gyroscopic) system 22 undergoes its own, separate conversion to another format within differencing system system 23. Moreover, *Rodden et al.* teaches that these "outputs" are not integrated into a stream of data at all. Instead, a comparison of the two different "outputs" is made, and the comparison results – not the "outputs" from systems 21 and 22 – is sent to averager 24 and switch SW1. See *Rodden et al.* column 3, lines 9-28.

It is clear that *Rodden et al.* fails to teach the controller system as claimed by the applicants in claim 1. In fact, *Rodden et al.* serves as an example of a drawback of conventional systems – application-specific software must be created to resolve the two separate attitude inputs, which is typically a cumbersome, high power and computationally intensive and expensive process that is prone to error -- a drawback which the applicants' claimed invention has overcome.

In contrast, the applicants' claimed invention solves this conventional problem (exemplified by *Rodden et al.*) of having each of a star tracking attitude system and gyroscope attitude system output their attitudes separately and then having to resolve them.

It is therefore clear that *Rodden et al.* does not teach or suggest the applicants' claimed controller system for synchronously integrating an output of the star camera system and an output of the gyroscope system into a stream of data as claimed in applicants' claim 1.

Accordingly, applicants' claim 1 is in condition for allowance. The applicants' claims 64 and 65 depend from claim 1 and thus are also in condition for allowance for at least the foregoing reasons. The applicants' independent claims 66, 70-72, 78, and 80-82 each include the recitation of a controller system for synchronously integrating star camera system and gyroscope system outputs into a stream of data. The method of independent claim 83 includes the recitation of selectively, synchronously integrating in a predetermined pattern the image of a star field output and the gyroscope angular rate output into a stream of data. (The applicants note here also that these specific claimed outputs are not taught by *Rodden et al.*) The method of independent claim 92 recites the step of selectively, synchronously integrating in a predetermined pattern the star camera attitude and the gyroscope attitude into a stream of data. Accordingly, claims 64-66, 70-72, 78, 80-83 and 92 are also in condition for allowance for at least the reasons above.

The Examiner also rejects claims 2 and 84 under 35 U.S.C. §103(a) as being unpatentable over *Didinsky et al.* in view of *Rodden et al.* and further in view of U.S. Pat. No. 5,745,869 to *van Bezooijen.*

Claims 2 depends from claim 1, and claim 84 depends from 83, each of which is in condition for allowance as discussed above. Accordingly, claims 2 and 84 are also in condition for allowance for the at least the same reasons.

The Examiner further rejects claim 3 under 35 U.S.C. §103(a) as being unpatentable over *Didinsky et al.* and [(*Rodden et al.*?) in view of] *van Bezooijen* further in view of U.S. Pat. No. 6,098,929 to *Falbel*, and claims 4 and 85 over *Didinsky et al.* and [(*Rodden et al.*?) in view of] *van Bezooijen* further in view of U.S. Pat. No. 6,577,929 to *Johnson et al.*

Claims 3 and 4 ultimately depend from claim 1, and claim 85 ultimately depends from claim 83. Accordingly, claims 3-4 and 83 are in condition for allowance for at least the reasons discussed in the applicants' previous Response with respect to claims 1 and 83, as well as the previous reasons discussed with respect to claims 2 and 84. To the extent that the *Rodden et al.* reference is also included in the combination to serve as a basis for rejection of claims 3, 4 and 85, these dependent claims are in condition for allowance for at least the reasons above with respect to independent claims 1 and 83.

Further, with respect to at least the rejections of claims 3-8, 2-43, 67-69, and 85-89 -- in addition to the reasons above and below -- the applicants respectfully submit that the need to combine together four (or more) patents in order to reject these claims is itself a strong indication that the claims are novel, non-obvious and inventive. The law prohibits the use of hindsight analysis. " One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention". See In re Fine, 837 F.2d 1071, 1075, 5 USPQ 2d 1596, 1600 (Fed. Cir. 1988).

The Examiner also rejects claim 5 under 35 U.S.C. §103(a) as being unpatentable over [*Didinsky et al.* in view of (*Rodden et al.*? in view of) *van Bezooijen* in view of] *Johnson et al.* in view of U.S. Pat. No. 5,396, 495 to *Carlson*. The Examiner further rejects claims 6 and 7 under

35 U.S.C. §103(a) as being unpatentable over [*Didinsky et al.* in view of (*Rodden et al.*? in view of) *van Bezooijen* in view of] *Johnson et al.* and further in view of U.S. Pat. No. 5,963,166 to *Kamel.*

Claims 5, 6 and 7 ultimately depend from claim 1. Accordingly, claims 5-7 are in condition for allowance for at least the reasons discussed above with respect to claim 1, as well as the reasons discussed with respect to claims 2.

The Examiner also rejects claims 8-21 and 86-87 under 35 U.S.C. 103(a) as being unpatentable over [*Didinsky et al.* in view of (*Rodden et al.*? in view of)] *Kamel* and further in view of U.S. Pat. No. 6,285,928 to *Tilley et al.*

First, claims 8-21 ultimately depend from claim 1, and claims 86-87 ultimately depend from claim 83. Accordingly, claims 8-21 and claims 86-87 are in condition for allowance for at least the reasons discussed above with respect to claims 1 and 83.

Moreover, with respect to claim 16 the Examiner states in pertinent part that "[i]n order for *Didinsky et al.* to be able to integrate the gyroscope data and the star camera data, the outputs at first must be isolated from each other and then integrated so that the data can be unaffected by the data of the other". The Examiner also states that in regard to claim 17, "without a programmable logic device, it would be impossible to integrate the data of the two".

Claim 16 does not recite that each system is isolated so that their data from each is unaffected by the other (although this is true generally). Instead, claim 16 covers the data output from the star camera system and the gyroscope system, and recites a command circuit for selectively synchronously integrating the outputs of the gyroscope system and the star camera system in a predetermined pattern to isolate their outputs during their integration.

As discussed above, *Didinsky et al.* (as well as *Rodden et al.*) does not teach a command circuit which synchronously integrates the outputs into a stream of data at all, much less integration of the outputs in a predetermined pattern to isolate the outputs from each other during integration. See also, for example, the applicants' specification at page 37, line 21 through page 38, line 12 and Figs. 11 and 12 where the camera system data and the gyroscope system data is integrated into stream of data C but is isolated -- i.e. camera data bits and gyroscope data bits may be interleaved for example -- during integrating to allow information to be processed more reliably and efficiently.

In the applicants' claim 17, a programmable logic device implements the aforesaid selective synchronous integration of the camera system and gyroscope system outputs in a predetermined pattern. In contrast, *Didinsky et al.* (and *Rodden et al.*) does not synchronously integrating the outputs into a data stream; does not teach isolating these outputs during integrating; and does not teach doing so in a predetermined pattern.

Accordingly, claims 16 and 17 are in condition for allowance for these additional reasons as well.

Claim 87 recites the method of claim 86 including selectively synchronously integrating the outputs of the gyroscope system and the star camera system in a predetermined pattern to isolate from each other each of the star camera system and gyroscope system outputs during their integrating. Thus, by reasoning similar to that discussed above with regard to claims 16 and 17, claim 87 is also in condition for allowance for this additional reason.

The Examiner also rejects claims 22-43 and 88-89 under 35 U.S.C. §103(a) as being unpatentable over [*Didinsky et al.* in view of *Rodden et al.* in view of] *Tilley et al.* and further in

view of U.S. Pat. No. 6,252,578 to *Hsieh et al.*

Claims 22-43 depend ultimately from claim 1, and claims 88-89 ultimately depend from claim 83 and thus are allowable for at least the reasons discussed above with respect to independent claims 1 and 83.

Additionally, with regard to dependent claim 22, for example, the Examiner states in pertinent part that "*Hsieh et al.* discloses a system which needs to be inputted into a stream of data and to do this a data packer is used".

First, *Hsieh et al.* does not teach of star camera system data and gyroscope system data as claimed by the applicants. Second, *Hsieh et al.* does not teach interleaving of the star camera system data and gyroscope system data. Third, as noted above with respect to claims 1, 16, and 17 for example, the cited references do not disclose, teach or suggest any of the applicants' claimed elements which precede using a data packer, namely, integration of the star camera system and gyroscope system data outputs into a stream of data, etc. See the discussions above. In other words, before a data packer is utilized at all, data from the gyroscope system and camera system is synchronously integrated, and interleaved using a data stream packer. It is only the applicants that teach those elements and features.

Accordingly, claim 22 is in condition for allowance for these additional reasons.

The Examiner also apparently rejects claims 44-49 and 51-52 under 35 U.S.C. 103(a) as being unpatentable over [*Didinsky et al.*? in view of *Rodden et al.* in view of] *Hsieh et al.*

Claims 44-49 and 51-52 depend ultimately from claim 1 and thus are allowable for at least the reasons discussed above with respect to independent claim 1.

The Examiner further rejects claims 67-69 under 35 U.S.C. 103(a) as being unpatentable over *Didinsky et al.* in view of *Rodden et al.* and further in view of *van Bezooijen* and further in view of *Johnson et al.*

Each of claims 67-69 include, *inter alia*, a controller system for synchronously integrating camera and gyroscope outputs into a stream of data, a feature not taught by the cited references as discussed above.

With respect to claims 67-69 the Examiner also states that it would have been obvious to use both the APS star camera system (disclosed in *van Bezooijen*) and the MEMs gyroscope system (disclosed in *Johnson et al.*) "because both are well known in the art and are commonly used".

Missing from the Examiner's analysis is the fact that *van Bezooijen* does not suggest a MEMs system, and *Johnson et al.* does not suggest an APS camera, and the fact that consequently neither of these cited references provides disclosure that would enable them to be used together, in contrast to the applicants' claimed invention.

Accordingly, for the above reasons, claims 67-69 are in condition for allowance.

The Examiner further rejects claim 79 as being unpatentable over *Didinsky et al.* in view of *Rodden et al.* and further in view of *Hsieh et al.*

Claim 79 recites, *inter alia*, a controller system for synchronously integrating an output of said star camera system and an output of said gyroscope system into a stream of data, the controller system including a data stream packer for interleaving said output of the star camera system and said output of the gyroscope system into the stream of data.

A controller for synchronous integrating is discussed above, as is the data stream packer for interleaving the star camera system and gyroscope system data into a stream of data.

Accordingly, for at least the same reasons, claim 79 is also in condition for allowance.

CONCLUSION

Each of the Examiner's rejections has been addressed or traversed. Accordingly, it is respectfully submitted that the claims 1-111 are in condition for allowance. Early and favorable action is respectfully requested.

If for any reason this Response is found to be incomplete, or if at any time it appears that a telephone conference with counsel would help advance prosecution, please telephone the undersigned or his associates, collect in Waltham, Massachusetts, (781) 890-5678.

Respectfully submitted,

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